



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,370	01/16/2002	Sabina J. Houle	2207/12117	2895

7590 09/05/2003

KENYON & KENYON
Suite 600
333 W. San Carlos, Street
San Jose, CA 95110-2711

EXAMINER

EVERHART, CARIDAD

ART UNIT PAPER NUMBER

2825

DATE MAILED: 09/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/053,370

Applicant(s)

HOULE, SABINA J.

Examiner

Caridad M. Everhart

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 11-1~~7~~, 18-21, 25-27 and 30 is/are rejected.
- 7) ☒ Claim(s) 5-10, 14-17, ²²⁻²⁴28 and 29 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Applicant's arguments with respect to claims 1-4, 11-13, 18-21, 25-27, and 30 are in view of the new ground(s) of rejection. Applicant's argument that Hiuga teaches the grooves in the die rather than in the heat spreader is agreed with, as although the package taught by Hiuga includes a channel recessed relative to the central area of the heat spreader as discussed in paper No. 3, the groove is not in the die.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 1-3, 11-12, 18-21, 25-27, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao, et al. ("Tsao") (US 6,607,942B1) in view of Orimo, et al. ("Orimo") (JP09312358) (abstract and figures).

Tsao discloses a heat spreader with a central portion with a groove in the central portion, which is recessed (col. 4, lines 45-53 and Fig. 4a). A semiconductor device and an adhesive layer are also disclosed (col. 4, lines 18-24). That the adhesive material is an interface material between the die and the heat spreader is shown in Fig. 4a. That the material is a thermal interface material is suggested by the figure, because one of ordinary skill in the art would infer that an interface between the die and the heat spreader would be chosen such as to conduct heat, since the purpose of the heat spreader is to conduct heat.

Tsao is silent with respect to the material spreading into the groove and the use of solder as the coupling material.

Orimo discloses a heat sink that has grooves and in which the solder used to couple the heat sink to the die spreads into the grooves (abstract and Fig. 3).

One of ordinary skill in the art would have combined the disclosure made by Orimo with the method taught by Tsao because the use of solder as the coupling material results in heat transfer between the heat spreader and the die and because the spreading of the material in the groove results in improved coupling, as shown by Orimo.

With respect to the dimensions of the groove, it is within the ordinary skill in the art to vary the dimensions of the groove, which is suggested by Tsao in the discussion that the number and arrangement of the grooves can be varied (col. 4, lines 45-60), as the dimensions of the grooves are a variable of the art, which one of ordinary skill in the art would be able to vary.

Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao in view of Orimo as applied to claim 1 above, and further in view of JP53011591 ("Sharp", cited in paper No. 3) (abstract only).

Tsao in view of Orimo are silent with respect to the recited materials.

Sharp is relied upon for the use of a copper heat sink and indium solder (abstract).

One of ordinary skill in the art would have been motivated to have combined the method taught by Tsao in view of Orimo with the disclosure made by Sharp because copper is known in the art as a heat sink material because of its high thermal conductivity and because indium solder is taught by Sharp in combination with a copper heat sink and in order to obtain the low thermal resistance as taught by Sharp.

Allowable Subject Matter

Claims 5-10,14-17,22-24,26-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not teach inter alia the wetting layer recited in the instant claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 703-308-3455. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 703-308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

C. Everhart
CARIDAD EVERHART
PRIMARY EXAMINER

C. Everhart
August 21, 2003